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Safety Awareness for responders to Emergency Operations: Work Zone Safety

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Goal

- Provide you with information to keep you:
  - Safe in the work zone.
  - Prevent injury and death.
  - The picture demonstrates worker not wearing reflective vests

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Introduction

Workers in areas where there are moving vehicles and Traffic must be informed of the special hazards they will be facing during recovery efforts. Some of the specific hazards in the Disaster Work Zone include:

- Ever changing roadway conditions as debris is cleared
- Keep your distance when driving loaded with debris.
  - materials can fly out of the trucks
- Stressed drivers
- Congestion

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Overview

1. Work Zone Hazards
2. Establishing a Proper Work Zone
3. Work Zone Equipment
4. Flagger & Work Crew PPE
5. Flagger/Work Crew Equipme
6. Flagger Information
7. Summary

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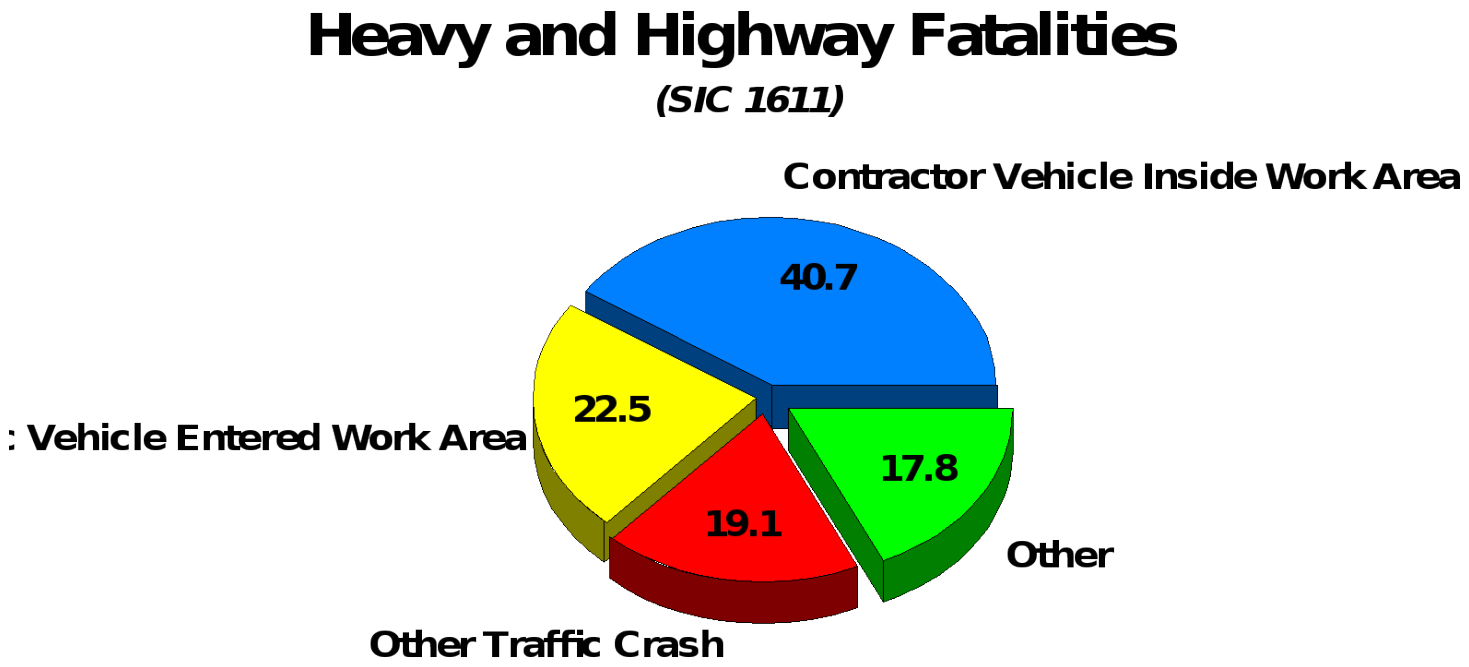
How are Roadway Construction Workers Killed?



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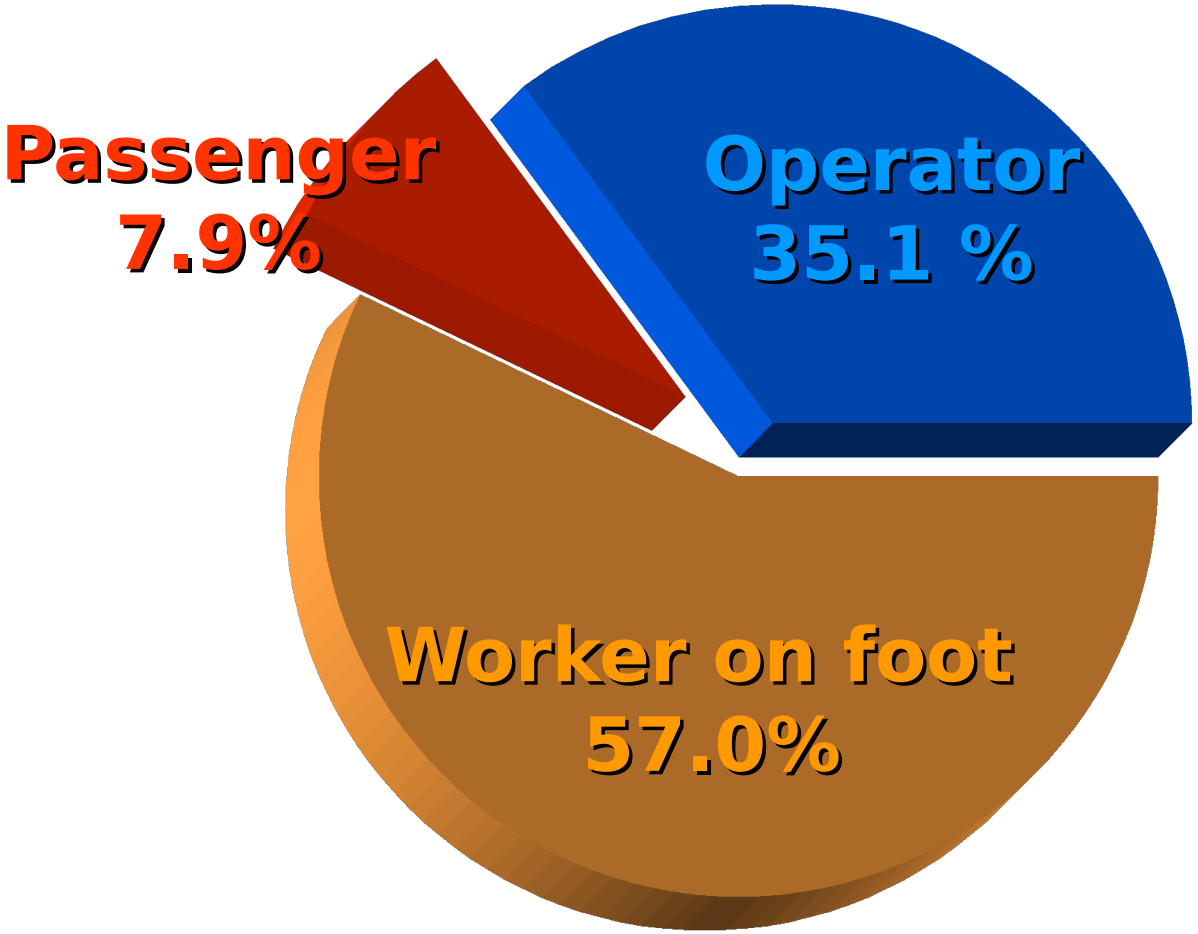
Where are Workers Killed



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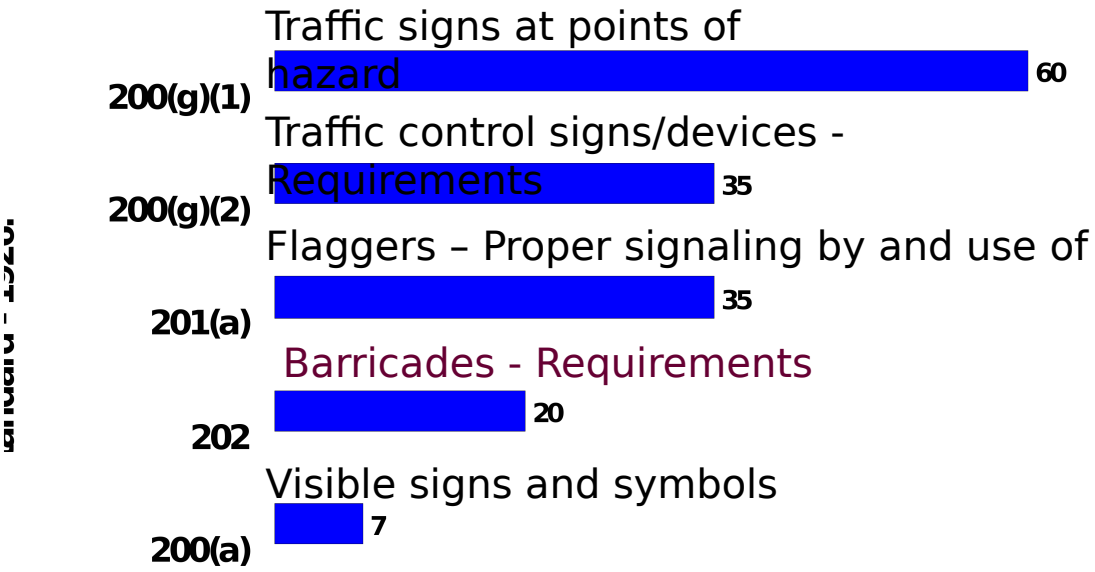
Subpart G - Signs, Signals & Barricades
(1926.200 - 203)



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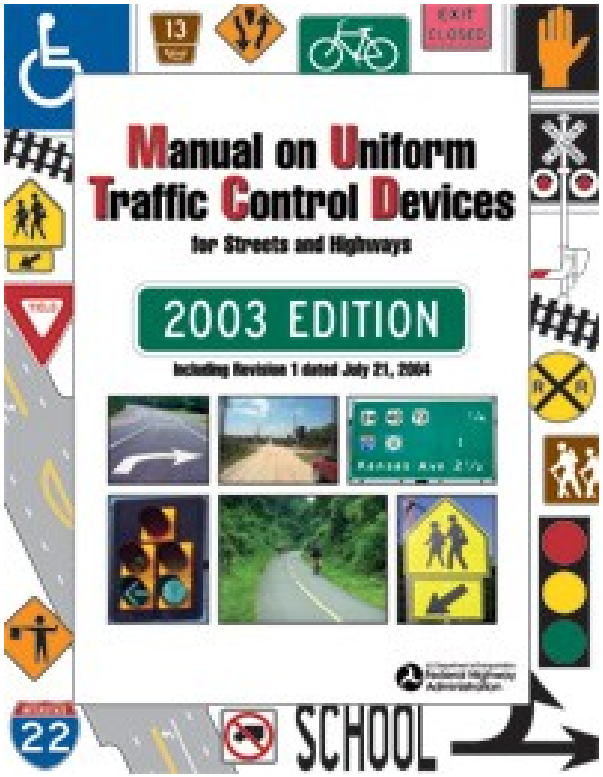
What is the MUTCD?


Manual on Uniform Traffic Control Devices
for Streets and Highways
2003 EDITION
Including Revision 1 dated July 21, 2004
SCHOOL

The Manual on Uniform Traffic Control Devices (MUTCD) was developed to create standardized control during roadway construction, maintenance, and utility (work zone) operations.

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The Unique Hazards of Katrina Work Zones

- Residential debris removal in narrow, uncontrolled residential streets
- Congested and uncontrolled intersections during utility work
- The ever changing/moving temporary work zones
- Aggravated drivers
- Hurried Drivers

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Residential Streets

This is a typical picture of residential debris removal:

- Improperly zoned, no warning signs, taper, nor identified work zone.
- Flagger is improperly dressed, using a red emergency flag instead of a Stop/Slow Paddle
- Very little control of the work zone

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Work Zone Traffic Safety

- Develop and use a site plan for the work z
  - Provide traffic flow details
  - Train workers
  - Advanced Warning Area
  - Transition Area
  - Activity Area (Work Space & Traffic Space), and
  - Termination Area
- Ensure work zone is well lit but control glare
- Use flaggers, traffic cones, and highway channeling devices to steer traffic away from workers.

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Work Zone Hazards

Consider All Electric Lines To Be Live

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Work Zone Hazards

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Work Zone Hazards Include:

- Struck-by Vehicles – Stepping Into Traffic Lanes
- Consider All Electric Lines To Be Live
- Ensure Proper Placement Of Personnel, Equipment, Vehicles, Signs, Cones and Barricades
- Maintain Communication With Other Flaggers

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Various work equipment & trucks have “blind spots” to the work crew – Be aware of……

The NO-ZONE

THE SHADED AREA SURROUNDING EACH VEHICLE REPRESENTS THE DANGER ZONE or “NO-ZONE” IN WHICH THE VEHICLE OPERATOR’S VIEW OF PEDESTRAN TRAFFIC IS GREATLY REDUCED OR OBSCURRED ALTOGETHER.

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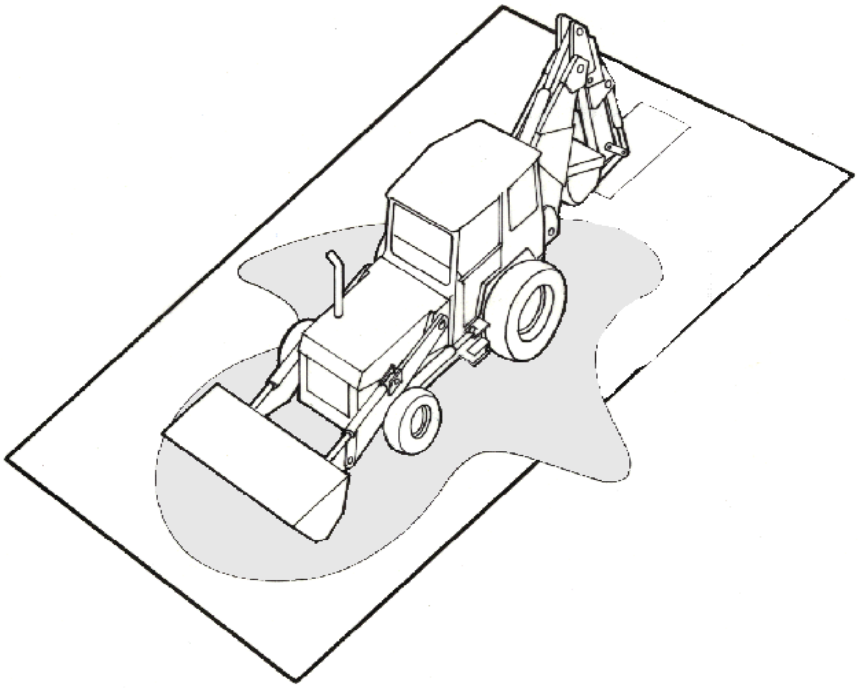
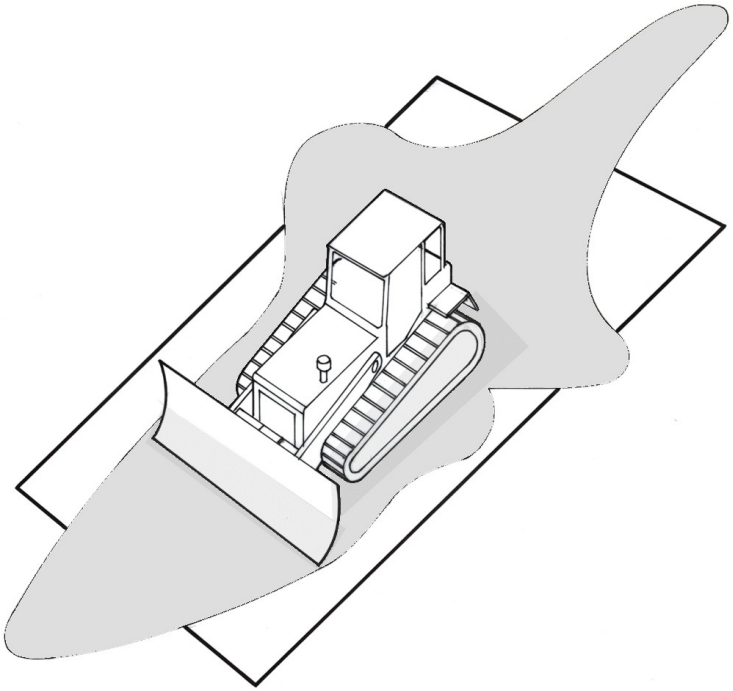
Operator sight distances from eye level to ground



Vehicle:

Rubber Tire Backhoe



Vehicle:

Bulldozer

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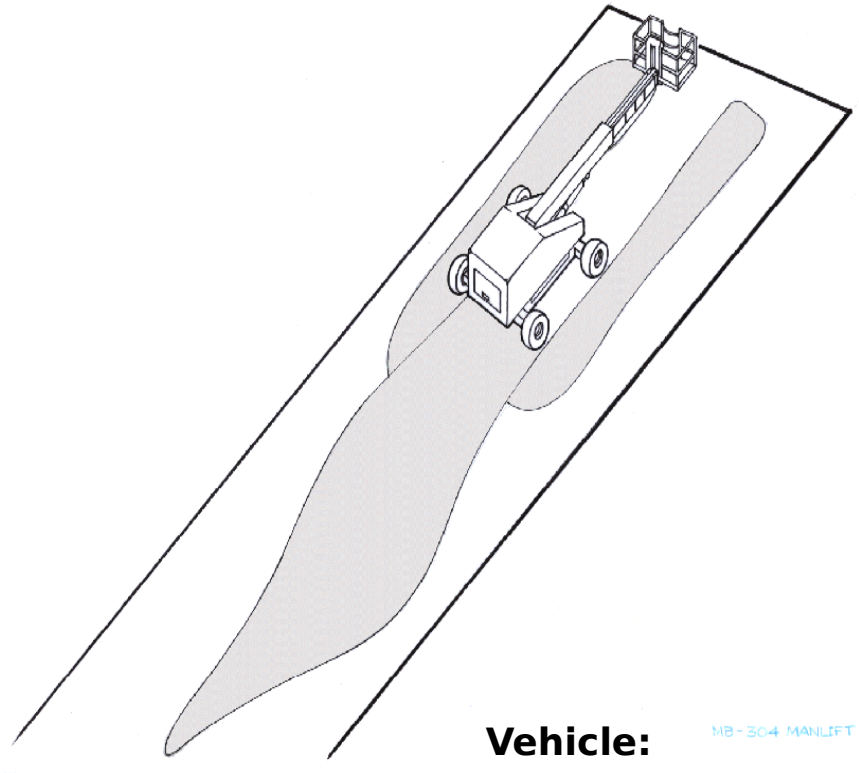
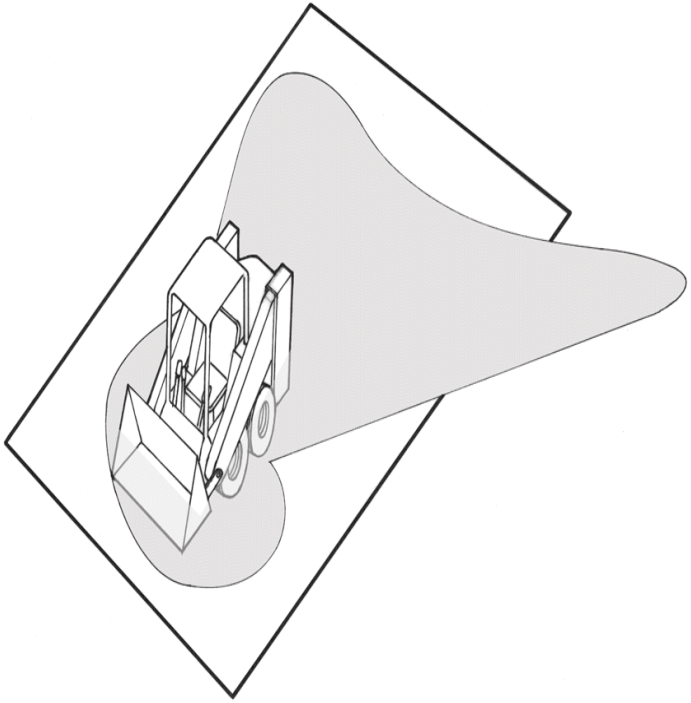
Operator sight distances from eye level to ground



Vehicle:

Manlift



Vehicle:

Bobcat/Skid Steer

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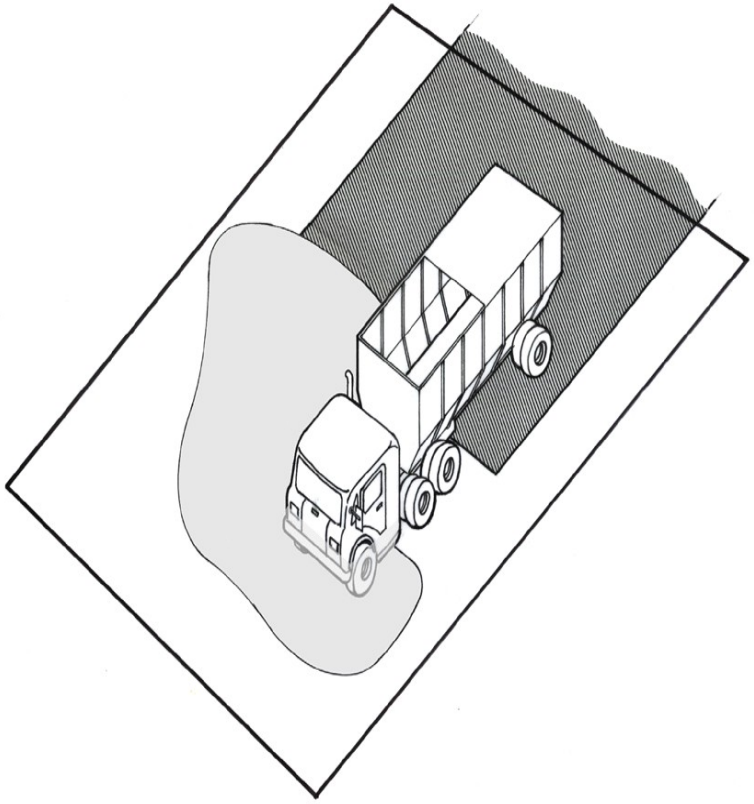
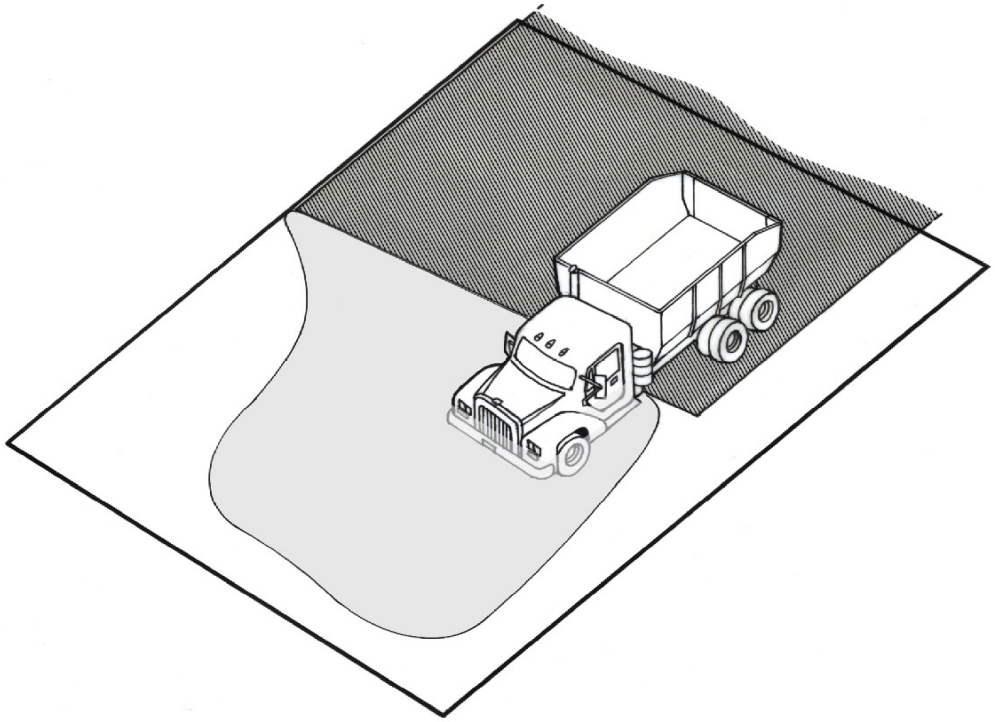
Operator sight distances from eye level t



Vehicle:

Refuse Truck



Vehicle:

5 ton Dumptruck

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Minimum Requirements

Work-zone traffic control must provide adequate notice to motorists that describes the condition ahead, the location, and the required driver response.

Once drivers reach a work zone, pavement markings, signing, and channelization must be conspicuous and unambiguous in providing guidance through the area.

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Stopping Sight Distance

Section 6E.05 Flagger Stations

Standard: Flagger stations shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.

Table 6E-1. Stopping Sight Distance as a Function of Speed

Speed (km/h)	Distance (m)	Speed (mph)	Distance (ft)
30	35	20	115
40	50	25	155
50	65	30	200
60	85	35	250
70	105	40	305
80	130	45	360
90	160	50	425
100	185	55	495
110	220	60	570
120	250	65	645
		70	730
		75	820

Class 2 vest is required

This worker is not in compliant high visibility apparel

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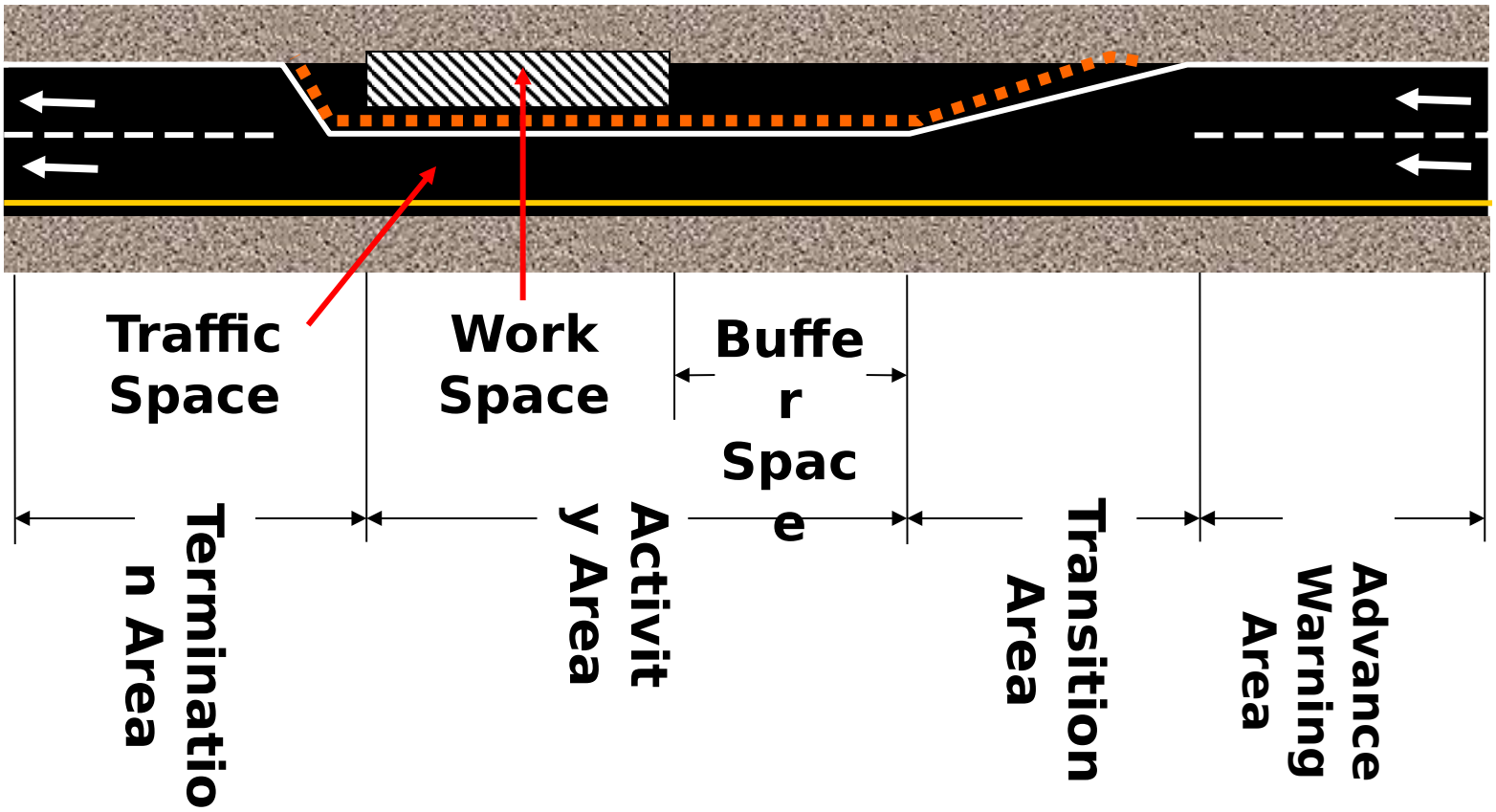
Component Parts of a Temporary Traffic Control Zone



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Minimum Signs Recommended in the Manual on Uniform Traffic Control Devices (MUTCD)

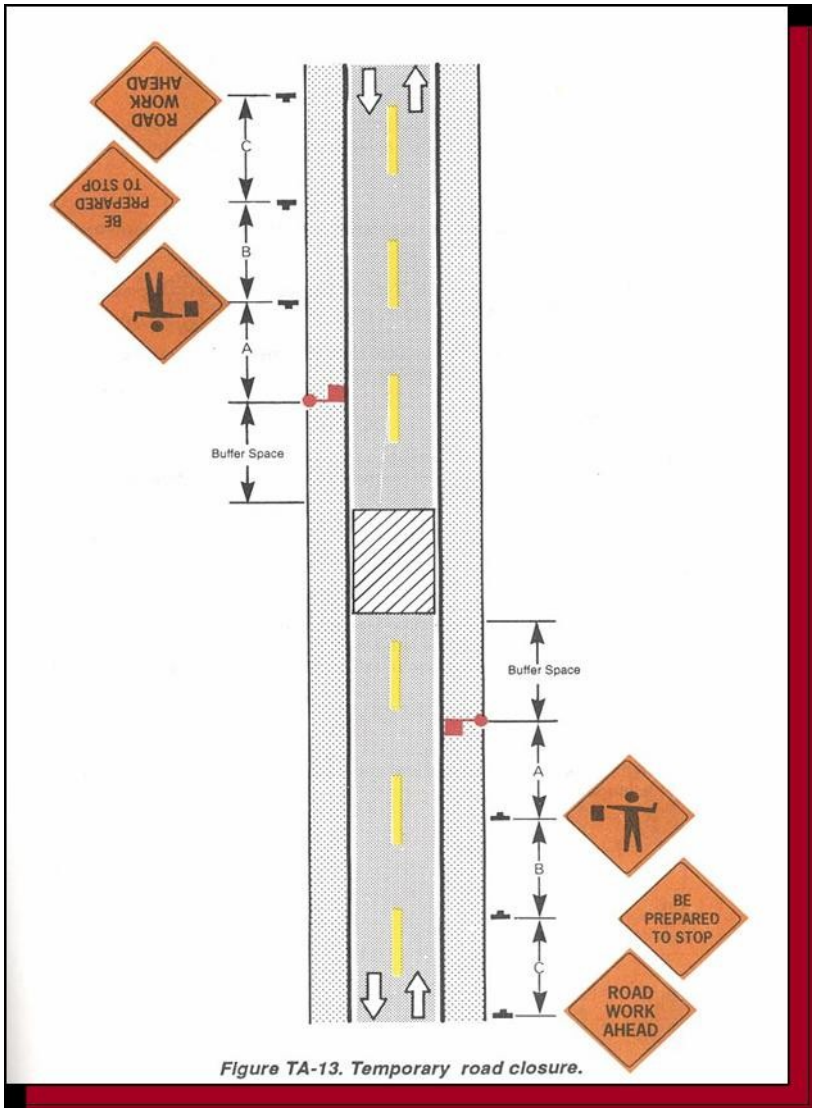
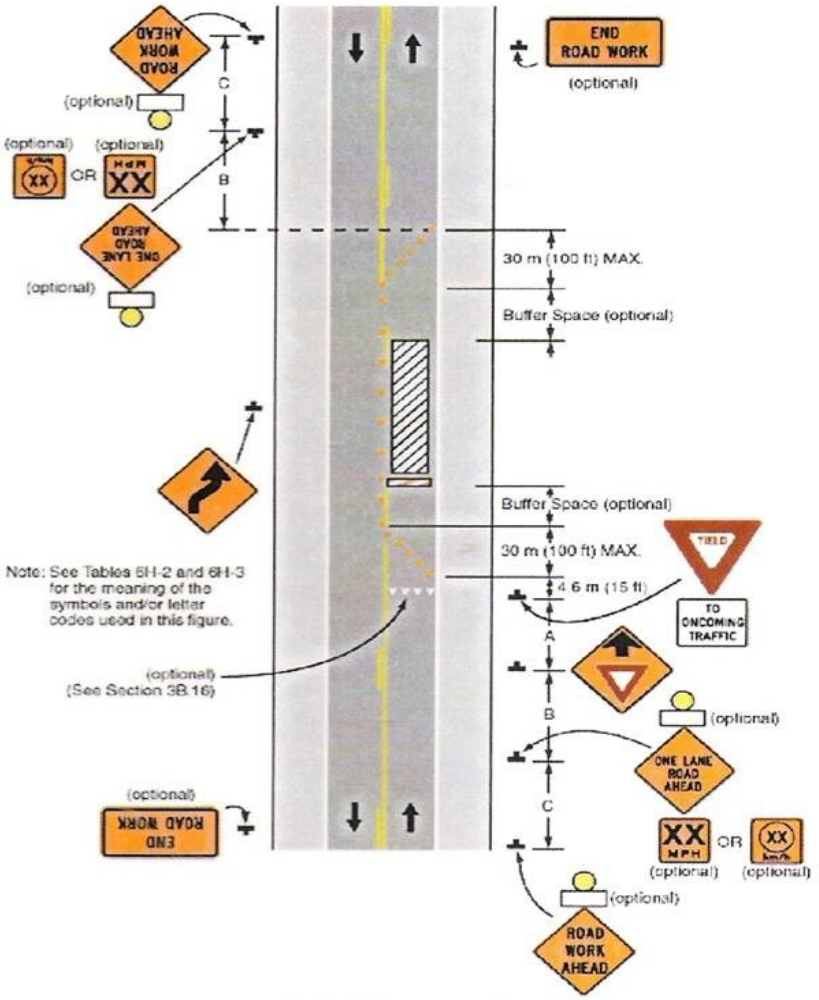


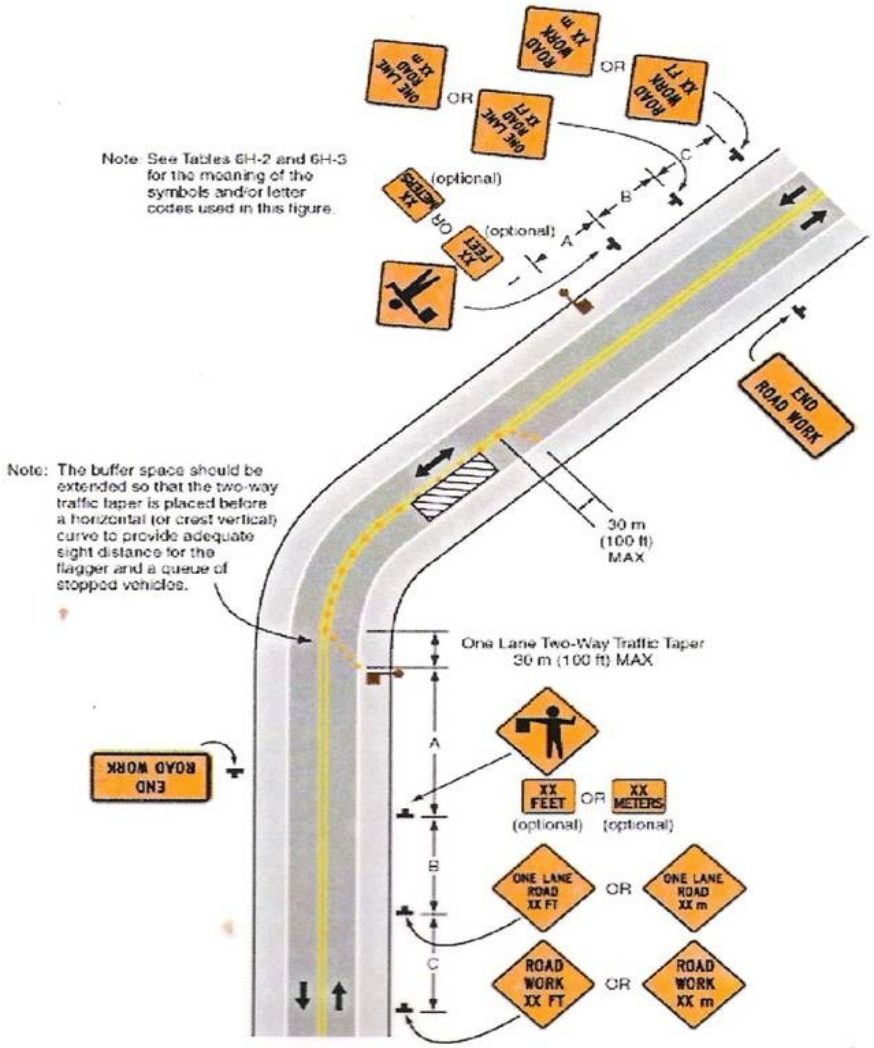
Figure TA-13. Temporary road closure.

Figure 6H-11. Lane Closure on Two-Lane Road with Low Traffic Volumes



Typical Application 11

Figure 6H-10. Lane Closure on Two-Lane Road Using Flaggers (TA-10)



Typical Application 10

Figure 6C-1. Component Parts of a Temporary Traffic Control Zone

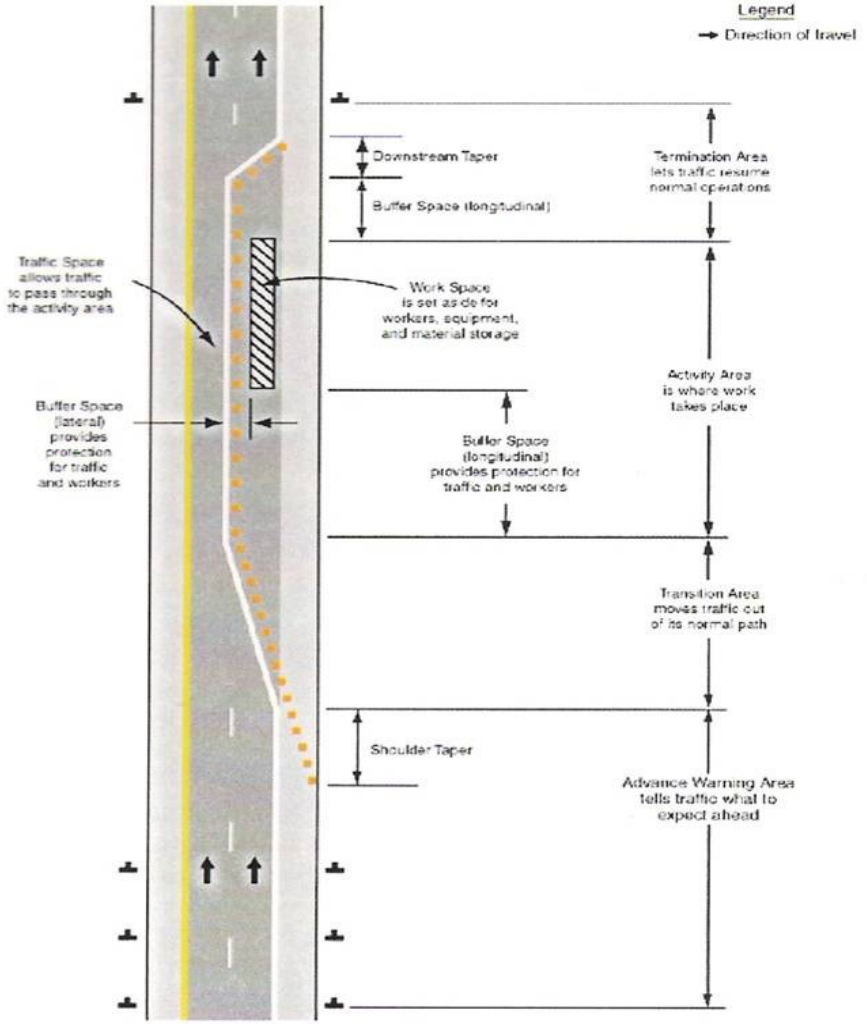
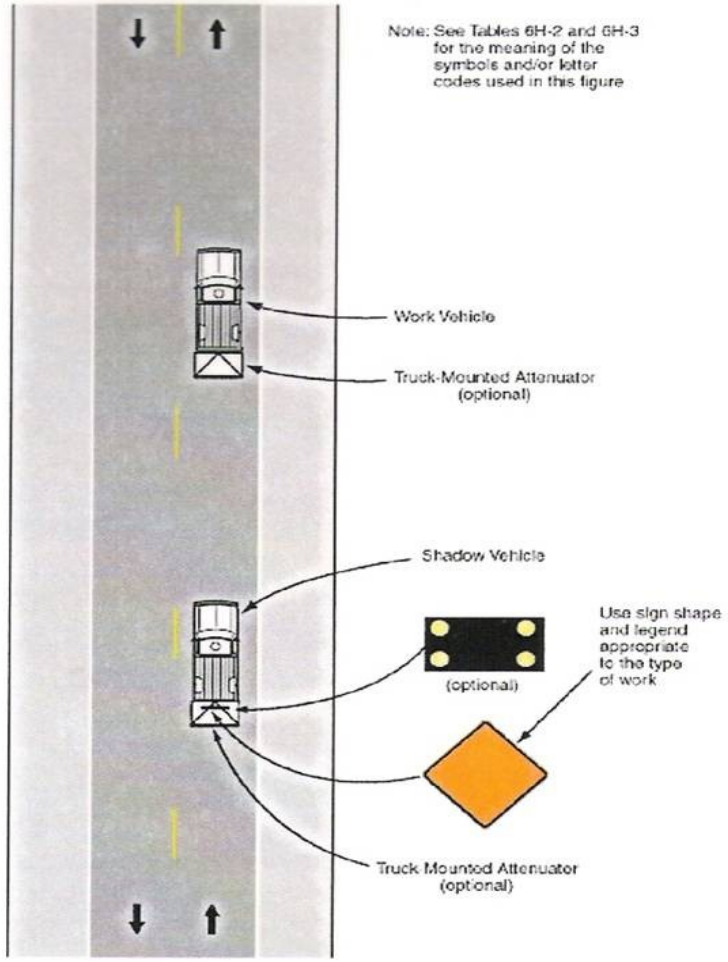


Figure 6H-17. Mobile Operations on Two-Lane Road (TA-17)



Typical Application 17

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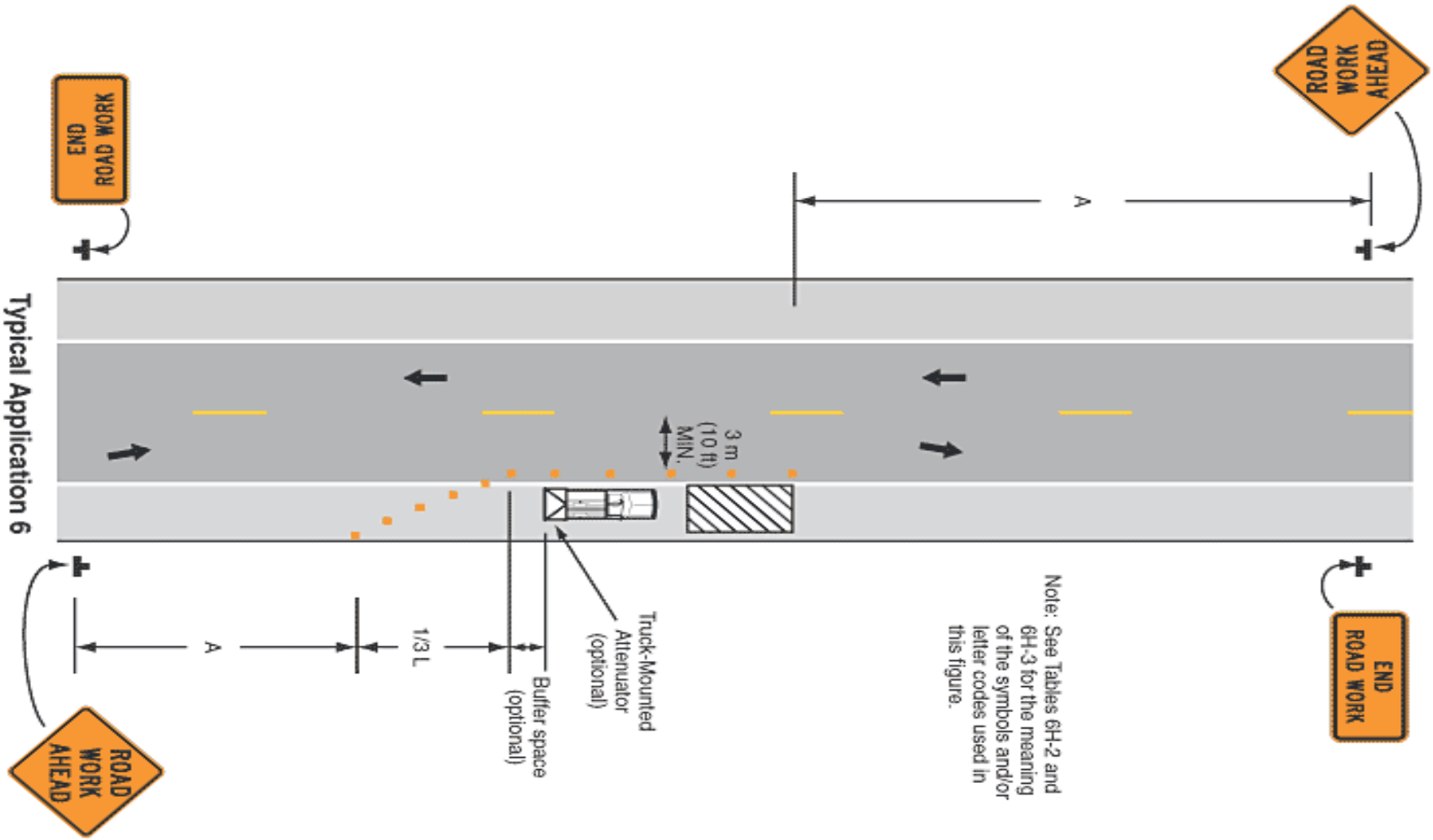
Typical Residential Layout


ROAD WORK AHEAD
END ROAD WORK
A
3 m (10 ft) MIN.
Typical Application 6
A
1/3 L
Buffer space (optional)
Truck-Mounted Attenuator (optional)
Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.
END ROAD WORK
ROAD WORK AHEAD

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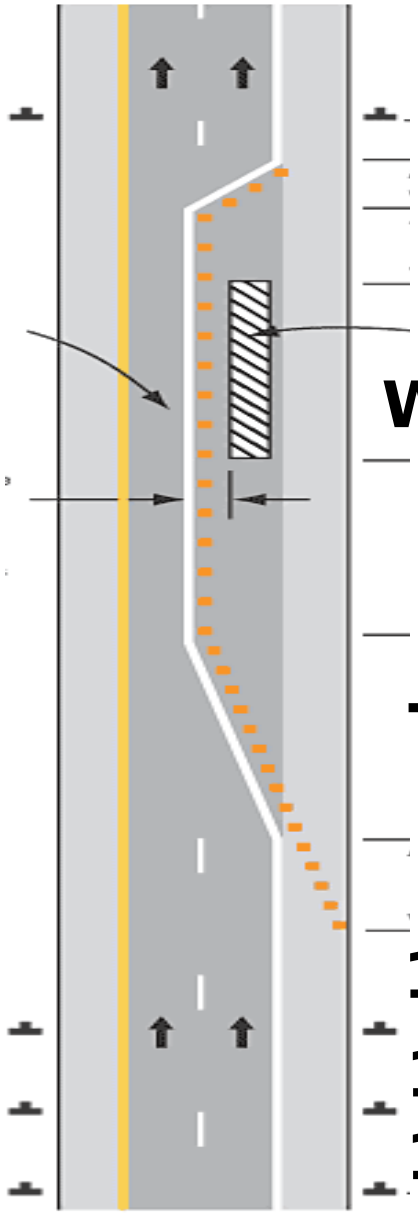

Downstream shifting taper

Buffer Space

125 ft, 5 cones

Work space

Buffer space 120 ft

Transition Area

245 ft, 8 cones

Merging Shoulder Taper

100 ft

100 ft

100 ft

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Buffer Space Data

Buffer Space length based on posted speed (minimum distance)

Speed (MPH)	35	55
Length (Feet)	120	335

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Advanced Warning Sign Spacing

Road Type	Distance Between Signs A	B	C
Urban (low speed)	100 ft	100 ft	100 ft
Urban (high speed)	350 ft	350 ft	350 ft
Rural	500 ft	500 ft	500 ft
Freeway/Expressway	1000 ft	1500 ft	2640 ft

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Taper Lengths and Number of Cones

Merging, Shifting and Shoulder Taper Lengths and Number of Channelization Devices (Cones) Used

(All minimums)

Lane Width	10 Feet				11 Feet				12 Feet				Shoulder Tapers (Assume 10' shoulders)	
	"L"		"1/2 L"		"L"		"1/2 L"		"L"		"1/2 L"		"1/3 L"	
MPH	Merging	Cones	Shifting	Cones	Merging	Cones	Shifting	Cones	Merging	Cones	Shifting	Cones	(ft.) length	Devices
20	70	5	35	3	75	5	40	3	80	5	40	3	25	3
25	105	6	55	3	115	6	60	4	125	6	65	4	35	3
30	150	6	75	4	165	7	85	4	180	7	90	4	50	3
35	205	7	105	4	225	8	115	5	245	8	125	5	70	4
40	270	8	135	5	295	9	150	5	320	9	160	5	90	4
45	450	11	225	6	495	12	250	7	540	13	270	7	150	6
50	500	11	250	6	550	12	275	7	600	13	300	7	170	6
55	550	11	275	6	605	12	305	7	660	13	330	7	185	6
60	600	11	300	6	660	12	330	7	720	13	360	7	200	6
65	650	11	325	6	715	12	370	7	780	13	390	7	220	7
70	700	11	350	6	770	12	385	7	840	13	420	7	235	7

*L for shoulder taper equals Shoulder Width x Speed.
Figures shown are for 10' shoulder.

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What Is Missing?

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Equipment For The Flagger

- Stop/Slow Paddle

- Red Flag (emergency Only)
- Traffic Cones

Replace with reflective cone

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Flagger
Personal Protective Equipment and High Visibility Clothing

PPE program should contain:

- **Identification and evaluation of hazards**
- **PPE selection, maintenance and use**
- **Employee training**
- **Conti us progra eview**

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Head Protection

ANSI Approved Hard hats must be worn to protect against impact and penetration of anticipated hazards, including electrical shock

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Foot and Leg Protection

- For protection against:
  - falling or rolling objects
  - sharp objects
  - molten metal and hot surfaces
  - wet, slippery surfaces

workers should use appropriate foot guards, safety shoes or boots and leggings.

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Eye and Face Protection

- Protection should be based on kind and degree of hazard present and should be:
  - ANSI Approved
  - reasonably comfortable
  - fit properly
  - durable
  - cleanable
  - Provide clear/unobstructed vision
  - UV Lenses are recommended for safety glasses when worker us exposed to sunlight

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Ear Protection

Exposure to high noise levels can cause irreversible hearing loss or impairment

- Noise can also create physical and psychological stress
- Disposable earplugs should be used once and thrown away
- Non-disposable ones should be cleaned after each use for proper maintenance

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Arm and Hand Protection

- **Burns, cuts, electrical shock, amputation and absorption of chemicals are examples of hazards associated with arm and hand injuries**
- **Insulating gloves and sleeves must conform to ANSI standards**

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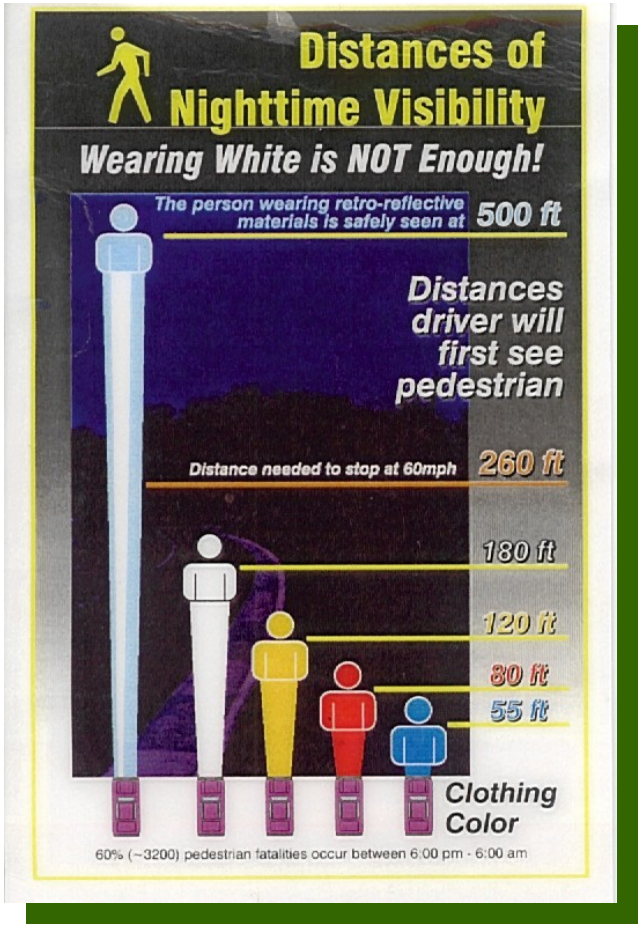
High Visibility Clothing

High visibility clothing **refers to reflective garments that workers should wear whenever their work place contains hazards related to low visibility or when they work near vehicles or moving equipment**


Distances of Nighttime Visibility
Wearing White is NOT Enough!
The person wearing retro-reflective materials is safely seen at 500 ft
Distances driver will first see pedestrian
Distance needed to stop at 60mph 260 ft
180 ft
120 ft
80 ft
55 ft
Clothing Color
60% (~3200) pedestrian fatalities occur between 6:00 pm - 6:00 am

Class 1 Garments

- For workers who have ample separation from traffic
- Traffic speeds do not exceed 25 mph
- Delivery vehicle drivers, parking lot attendants, warehouse workers

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Class 2 Garments

- For workers who need visibility in inclement weather conditions
- Traffic speeds between 25 & 50 mph
- Targeted at law enforcement conducting traffic control, toll gate personnel, airport ground crews, etc.

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Class 3 Garments

- **Highest level of conspicuity**
- **Wide range of weather conditions**
- **Traffic speed exceeds 50 mph**
- **Targeted at road construction, utility workers, survey crews, etc.**

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Respiratory Protection

Respiratory protection is required when there is a potential exposure to harmful dust, fogs, fumes, mites, gases, sprays, or vapors

- **Employers/Workers have Responsibility for:**
  - **Providing (Employer)**
  - **Wearing**
  - **Inspection**
  - **Maintenance**
  - **Cleaning**
  - **Storage**
  - **Training**
  - **Record Keeping**
  - **Medical Requirements**
  - **Respirator Fit**

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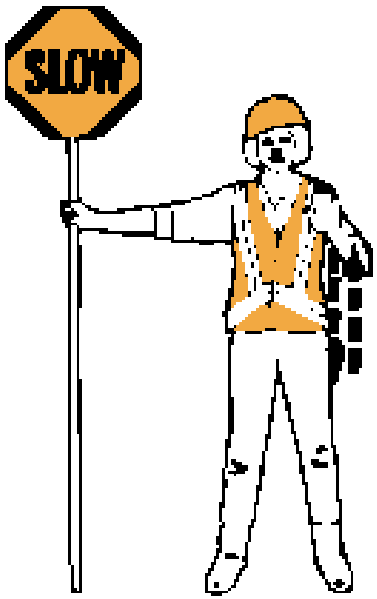
Use of Hand-Signaling Devices by Flaggers



TO ALERT AND SLOW TRAFFIC

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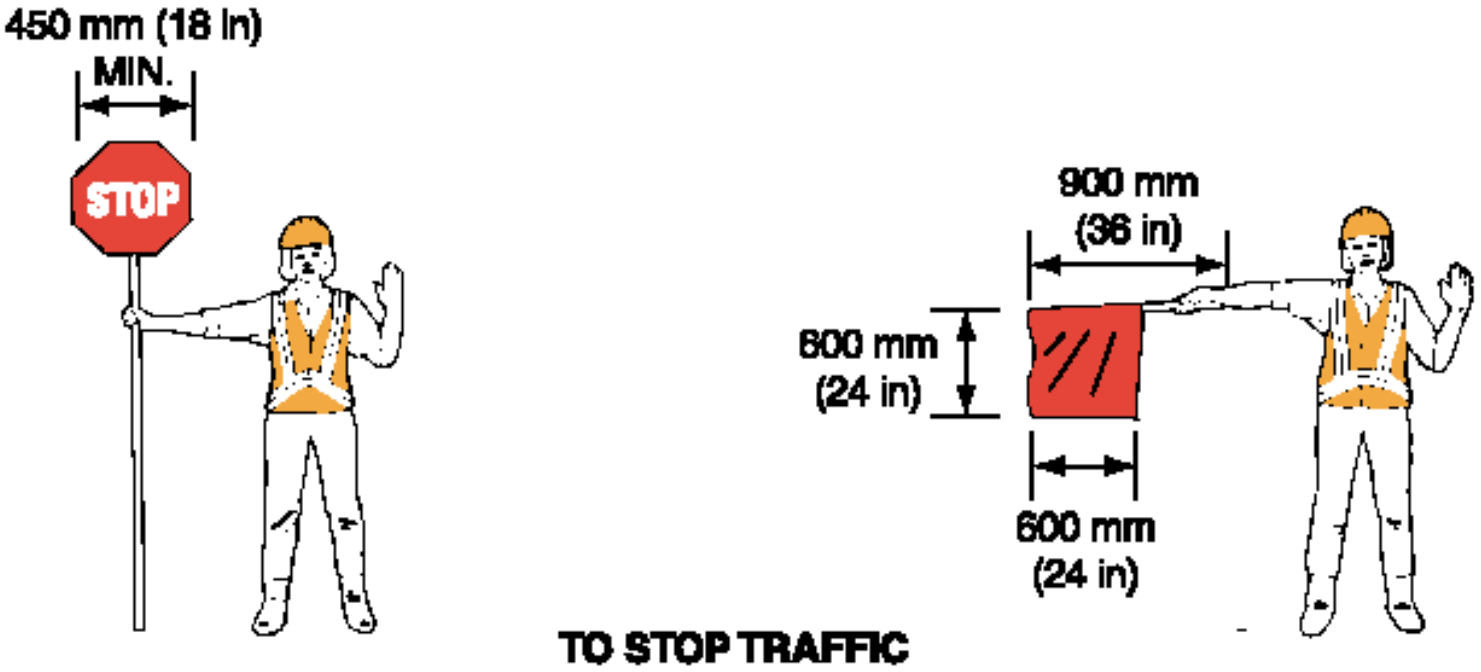
Use of Hand-Signaling Devices by Flaggers

PREFERRED METHOD
STOP/SLOW Paddle

EMERGENCY SITUATIONS ONLY
Red Flag



TO STOP TRAFFIC

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Red Flags are for Emergencies Only

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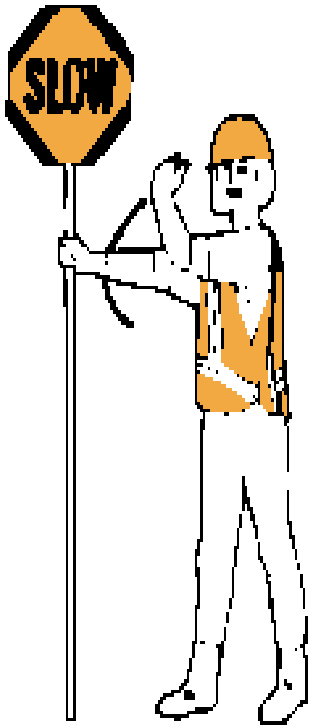
Use of Hand-Signaling Devices by Flaggers



TO LET
TRAFFIC PROCEED

- Flaggers should use STOP/SLOW paddles
- The STOP sign should be octagonal with a red background and white letters and border
- The SLOW sign is the same shape, with an orange background and black letters and a border

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Do Not:

- Mingle with crew
- Leave your post
- Turn your back
- Sit down on job

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Flagger Safety

- **Stand in the Proper Location**
- **Remain Attentive**
- **Always Face Traffic**
- **Communicate Effectivel**
- **Clothing and Equipment Meet Standards**
- **Proper Training**

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Traffic Control Devices

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Traffic Control Devices

Signs

a. Regulatory Signs

b. Warning Signs

c. Guide Signs

Portable Changeable Message Signs

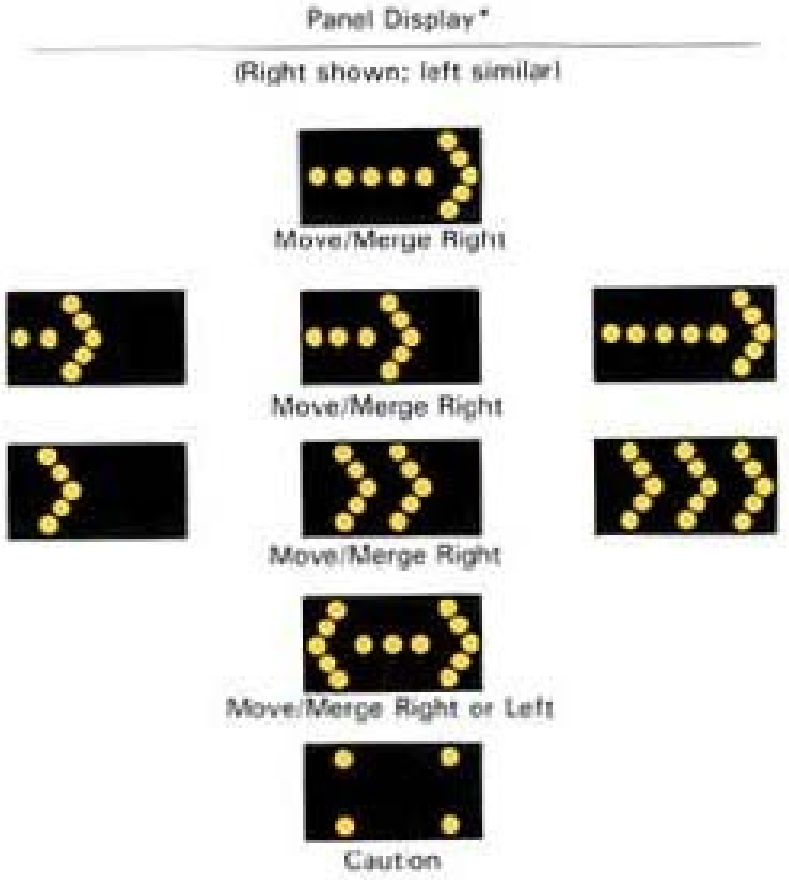
Traffic Control Devices

Arrow Displays

a. Arrow Display Specifications

b. Arrow Display Application

High-Level Warning Devices



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Traffic Control Devices

Channelizing Devices

(1)Cones

(2)Panels

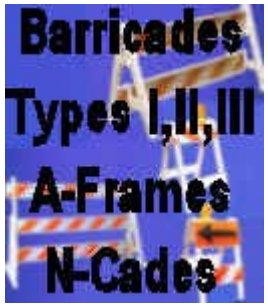
(3)Drums

(4)Barricades

(5)Portable Barriers

(6)Temporary Raised Islands

(7)Other Channelizing Devices



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Traffic Control Devices

Markings

a. Pavement Marker Applications
b. Interim Markings
c. Raised Pavement Markers
d. Delineators

Lighting Devices

a. Function
b. Floodlights
c. Flashing Identification Beacons (Flashing Electric Lights)
d. Steady Burning Electric Lamps
e. Warning Lights

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Traffic Control Devices

Other Devices

a. Impact Attenuators

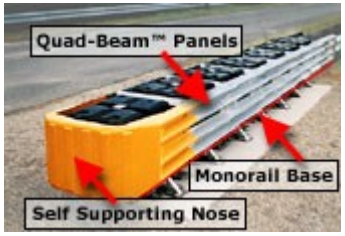
b. Portable Barriers

c. Temporary Traffic Signals

d. Rumble Strips

e. Screens

f. Opposing Traffic Lane Divider



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Professionalism

- Mentally alert
- Good physical condition
- Courteous
- Authoritative

Remember, the safety of your co-workers depends proper work zone design and the Flagger!!

STOP

PROCEED

SLOW